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one-half or even one-third. It is not generally known that this country holds the record for a long-distance voyage.

On July 1, 1859, La Mountain and three others sailed from St. Louis, Mo., to Henderson, N. Y., 870 miles in nineteen hours. Such constancy and velocity of air currents is seldom thought of and could have been found only, as in this case, at a height of 6,000 to 8,000 feet.

The balloon route would seem the ideal method of reaching the Pole and the French are already planning for such a voyage in 1898. Let them first bring their balloon to this country and make the Atlantic voyage in the track of steamers where the least untoward event will not be absolutely fatal. Also, by all means, let the balloon be placed at a height of at least 6,000 feet. It is just as easy to keep a balloon there as close to the earth. At Mt. Washington (6,300 feet) there have been frequent cases of west winds of 100 miles and over per hour for 36 hours, and this would mean less than 40 hours for the trip.

Of course, the great question is as to the occurrence of storm and high-area conditions at the Pole similar to those in more southerly latitudes, and the evidence from weather maps made near the Pole seems to show a great similarity. If so, any steady wind near the Pole would give a straight course to the Pole and the same wind would give a straight course back to civilization. It is a pity that with so much interest centered in this enterprise there should be so many fakes of carrier pigeons, etc., started. It is very rare, indeed, that a carrier has been known to fly 1,000 miles and then only after being taken over some part of the course half a dozen times. For a carrier to go 1,500 or 2,000 miles is an unheard-of feat.

H. A. HAZEN.

AUGUST 21, 1897.

SCIENTIFIC LITERATURE.

Agriculture in Some of its Relations with Chemistry. By F. H. STORER. New York, Charles Scribner's Sons. 1897. Pp. 1901. \$5.00.

The new edition of Storer's 'Agriculture' is in three volumes; it is accompanied by a very

full and well-arranged index, which adds to its value as a reference work. The author is modest in his title, for not only is agriculture dealt with in its relations to chemistry, but very largely in its relations to the allied sciences, physics, physiology, botany and zoology.

For example, the contents of Volume I. include thirteen chapters, and in the first six the relations of physics and plant physiology to agriculture are discussed quite as fully as are the relations of chemistry in the remaining chapters. In Chapter III. 'Relations of Water to the Soil' is discussed, and in Chapter IV., 'Movement of Water in the Soil;' Chapter V. is devoted to a study of the principles of 'Tillage,' and Chapter VI., 'Implements and Operations of Tillage.' In these branches chemistry is not the primary science involved. In Chapter I. 'The General Influence of Soil and Air to the Plant' is treated, and in Chapter II., 'The Atmosphere as a Source of Plant Food.' In the discussion of these subjects the importance of the relations of plant physiology are fully recognized.

I note the above in order to show the general scope of the work; it is not limited to a setting forth of the relations of chemistry, as it could not well be and give a broad view of scientific agriculture.

That the author regards the question of manure to be of very great importance is shown by the elaboration of the various topics entered into, especially concerning the sources of supply, the modes of action and methods of using the various products. Seventeen chapters, seven in Volume I. and ten in Volume II., aggregating over 750 pages, are devoted to this one branch of scientific agriculture, and in which chemistry is the primary science involved.

His method of treating of the artificial fertilizers is worthy of particular mention. Not only is the theoretical consideration concerning the composition and character of the various fertilizing materials and their modes of action given, but numerous experiments from leading authorities are cited, thus putting before the student the original source of the information; a point often greatly desired by those who have not had a broad training in these lines, and

are thus not fully acquainted with the literature of the subjects involved.

Particular attention should also be called to Chapters XVIII., XXVI. and XXVII., concerning 'Humus or Vegetable Mould,' 'Lime and Lime Compounds,' and 'Sodium Compounds.' It is eminently desirable that the information given in these chapters should be more generally disseminated, in view of the useless dissertations on these subjects by irresponsible writers. Humus, particularly, is an engaging topic for discussion by those who do not understand what it means. The same is true of lime—fruitless discussions are entered into, largely because of the lack of knowledge concerning the principles involved. So, too, with the matter of sodium as a fertilizer; papers teem with articles that are calculated to lead astray rather than to fix valuable truths in the mind of the farmer. Such articles also seem to possess a peculiar attraction for the general reader, and the result is 'confusion worse confounded.'

In Chapter XV. of Volume II. the subject of 'Symbiosis, or Blended Growth,' is discussed in the light of the recently acquired facts concerning this very important subject

That the legumes may and do, under proper conditions, use atmospheric nitrogen, is one of the most important recent discoveries in agricultural science, and the matter in its scientific and practical relations is fully and clearly set forth.

Volume III. contains fourteen chapters. It treats more particularly of 'The Theory and Practice and Systems of Crop Rotations,' the principles involved in and the advantages of 'Irrigation,' 'The Use of Sewage,' and 'The Growth and Management of Cereal Crops,' hay and pastures and the 'Making of Silage.' In the handling of these subjects, not only are the principles of chemistry as applied to agriculture well traced and made plain, but important practical suggestions are made concerning the economical principles involved in the general management of farms and in the growth of the various crops. The chapter on irrigation, while written from 'the point of view of a New Englander,' is, in view of the necessity of fully utilizing the natural advantages of the East,

very timely, since it calls attention to the subject and points out conditions which are necessary for successful irrigation. Much of historical interest is included, also. The chapter on 'Ensilage'—it should be 'Silage'—is also up-to-date and includes much of value not otherwise readily accessible.

On the whole, the work may be regarded as of very great value to students and farmers alike, and should be in the library of every progressive man. The reader or student who takes up these volumes cannot fail to be impressed not only with the vastness of the subject included under the title 'Scientific Agriculture,' but also with the very great necessity to farmers of the present day of a knowledge of the principles upon which agriculture is based.

It may, perhaps, seem strange to the average person, that so little of the work of American investigators is cited by the author, for, with the exception of the Chapter on 'Silage,' comparatively few references are made to experiments conducted in this country. This is, doubtless, due in part to the fact that our experiment stations are comparatively new institutions, and that thus far but few workers are engaged upon purely scientific problems; much, however, of scientific interest, and that would add to the value of the work, has been overlooked.

While the work is a veritable storehouse of information, there is a profuseness of statement and an elaboration of details which seriously detracts from its usefulness, either as a ready work of reference or as a text-book for the student or progressive farmer. Sharp, clear-cut statements of principle and of fact are attractive, and appeal quite as strongly to the general reader in works of a scientific nature as in other lines of literature.

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The Sense of Beauty, being the Outlines of Aesthetic Theory. GEORGE SANTAYANA. New York, Charles Scribner's Sons. 1896.

So much has been written upon the theory of Aesthetics which, from the point of view of the trained intelligence, is nonsense pure and simple that the appearance of so noteworthy a